

**Centers of Academic Excellence
in Geospatial Sciences
Program Metrics and Evaluation Criteria**

*Jointly Sponsored by the National Geospatial-Intelligence Agency (NGA)
and the United States Geological Survey (USGS)*

Goal

The goal of the CAE in Geospatial Sciences (CAE GS) Program is to build, strengthen and cultivate the current and future geospatial sciences workforce for the U.S. government—make it second to none. A U.S. government workforce (to include the supporting industry) is needed with the right mix of emerging skills, education, knowledge and competencies to keep America on the leading edge in the application and use of geospatial sciences for national security, military planning and operations; homeland security and disaster management; earth sciences, and global security issues in energy, health and the environment. The CAE GS program will contribute significantly to advancing these missions through inculcating students with state-of-the-art geospatial sciences tradecraft, methodologies, and technologies.

Vision

The Vision of the CAE GS Program is to:

- Champion academic programs and disciplines that commit to excellence in the fields related to geospatial sciences education at the graduate and undergraduate levels
- Emphasize faculty development and familiarization in improving geospatial sciences curricula, scholarship, professional engagement and instructional capabilities
- Improve and advance, on a continuing basis, the quality of geospatial sciences programs, in partnership with faculty, students and other relevant organizations and institutions
- Foster and encourage further development of strong geospatial sciences focused education and depth in GS research
- Provide the Nation with GS expertise and a pipeline of qualified and eligible students poised to become geospatial professionals supporting U.S. government missions

CAE GS Program Eligibility and Summary

The CAE GS Program is open to all current regionally accredited two-year and four-year colleges and graduate level universities. All institutions must hold current regional accreditation as outlined by the Department of Education (<http://ope.ed.gov/accreditation/>).

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Overall CAE GS requirements are:

Program requirements: Demonstration of

- Outreach/Collaboration
- Center for Geospatial Science Education
- Robust and Active Geospatial Science Academic Program
- Geospatial Science is Multidisciplinary within the Institution
- Student-based Geospatial Science Research
- Number of Geospatial Science Faculty and Course Load
- Active Faculty in Current GS Practice and Research

Course requirements – a core (mandatory) set of GS Knowledge Units (KUs) that all institutions must address in their curriculum; and for four-year colleges and research universities choose five KUs from a set of optional KUs, to which the institution must map.

For the first year pilot, a select group of institutions will be designated as NGA/USGS Centers of Academic Excellence for Geospatial Science. The pilot will provide ample opportunity to assess operational protocols, acquire best practices and lessons learned. This information will be used to mature the CAE in GS. Further, it will help shape protocols to ensure alignment with the NGA Strategy core mission objectives. Starting in the fall semester 2015, each institution shall demonstrate how they will recognize students in their transcript, diploma, etc. who successfully complete a course of study that has a minimum of 18 credit hours mapped to the CAE KUs as having GS core competency in their education. While any education aligned to the CAE KUs is valued, those students with a concentration in their education aligned to the CAE GS will be of highest interest to employers supporting U.S. Government missions aligned with geospatial sciences.

Focus Area (Optional)

The Focus Areas for the CAE GS are designed to reflect institutions that not only meet the core KUs, but also meet *all* optional KUs in a single Focus Area (FA), such as Remote Sensing or Cartographic Sciences. The US government has significant interest in students who have deep expertise in these technical areas, and would like to specifically identify those institutions that offer and graduate students with a deep GS knowledge base.

The list of Focus Areas is:

- Geospatial Analysis
- Cartographic Science
- Remote Sensing/Imagery Science
- Photogrammetry
- Information Science
- Aeronautical Science
- Navigation and Location

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All institutions have the option to apply for one or more CAE GS Focus Area (FA) designations, but are not required to do so. The criteria to becoming a CAE in GS with a Focus Area include:

- Successful meeting of all requirements for the CAE GS designation (i.e. meeting all core KUs and at least 5 optional KUs).
- Successful mapping of the institutions curriculum to all of the KUs identified in the FA. (Meeting all KUs in a FA, also counts toward the 5 optional KUs needed for meeting the basic requirements)
- Demonstration that a student can reasonably complete the necessary course of study to include all KUs identified in the FA
- By year the end of the second year of being a designated CAE for Geospatial Sciences, the institution must provide student certificates or acknowledgement on their student transcript to those that complete the FA course of study. The certificate or transcript acknowledgement must clearly identify the specific Focus Area achieved.

Knowledge Units

The KU section will require institutions to address how it meets each Core (all institutions) and chosen Optional KU (for 4-year college and research universities). An institution has many ways to demonstrate how a program meets/fulfills a KU. Some examples include: course syllabus, course outline, student assignments, lab assignments, research/independent study assignments, and modules in a course/collection of courses. Required information will include course syllabi, course outlines and justifications showing where and how the KUs are addressed in the curriculum. One course may fulfill the requirements of multiple KUs and multiple courses may fulfill the requirements of a single KU. Each KU description includes the required number of Topics and Learning Objectives that must be met.

Program Evaluation

The Senior Executive for Academic Outreach & STEM (SEAO) Program Office staff will lead coordinating the evaluation processes. The evaluation of institutions' submissions will be conducted by Subject Matter Experts. As an option, the last phase of the criteria may be (at NGA and USGS's discretion) an on-site campus evaluation focused on course content, course relevance, and faculty involvement. If that option occurs, the institution will be contacted no less than one month in advance of a visit, should NGA and USGS deem the visit warranted based on the initial evaluation of the application submission. A checklist of the requirements is provided at the end of this document to assist in ensuring complete submissions for evaluation.

CAE GS Designation

The initial “designated” pilot institutions will be designated as a Center of Academic Excellence (CAE) in Geospatial Sciences (GS). The designation will be valid for three (3) consecutive years from the date of the official letter from NGA and USGS as documentation of the institution’s designation selection. At the three year mark, the institution must verify their continued compliance with the most recent CAE criteria in order to receive a re-designation. NGA and USGS expect that designated colleges/universities will keep current with evolving methods, research and technologies in multi-disciplinary disciplines aligned with geospatial sciences. Future criteria (including KUs and FAs) will continue to be reviewed annually and strengthened as appropriate to keep pace with the evolution of geospatial sciences methods and technology. Designation as a CAE in Geospatial Sciences does not carry a commitment of funding from NGA or USGS.

CAE GS Program requirements:

1. Outreach/Collaboration. The institution must demonstrate how Geospatial Science is extended beyond the normal boundaries of the Institution.

Overall Point Value: 12 points minimum/28 points maximum

- a) Shared curriculum, such as GS teaching materials provided to, and/or deliberate engagement with, and/or shared faculty with diverse colleges/universities (Hispanic and Women Serving, Historically Black Colleges and Universities (HBCUs), two-year community colleges, or K-12 schools.)
Point Value: Up to 8 points based on the number of institutional relationships and/or depth of any one or more relationship
- b) Reciprocity of credits (e.g. Accepting academic credit in GS courses from a diverse cohort of colleges/universities or two-year community colleges; or two-year community college reciprocity agreements with 4-year institutions). Evidence that GS-related courses from the above types of schools are accepted for credit at the applying institution
Point Value: Up to 5 points/3 points required.
- c) Sponsorship or participation in state, regional, or national GS events/activities within 3 years of submission. Sponsorship of GS curriculum workshops, colloquia, etc. (e.g. sponsorship of workshops or camps for K-12, community colleges, state homeland security, industry, etc.).
Point Value: Up to 5 points.
- d) Local or State Government Outreach. Sponsorship of events such as workshops, demonstrations of geospatial sciences applied to government services, educational seminars for government employees, etc.

Point Value: Up to 5 points.

- e) Community Outreach. Sponsorship of community events such as geospatial sciences education for local schools, adult education centers, senior centers, etc.

Point Value: Up to 5 points.

2. Center for Geospatial Science Education. The institution must have a formal organizational structure such as a department, program of study or “Center” for GS Education, which serves as a resource for faculty and students. The term “Center” is used in a general sense and includes “departments,” “laboratories,” etc. The formal organizational structure should provide guidance on GS curriculum and programs, general GS information, and promote collaboration and interaction among students, faculty and related programs of study. The “Center” must be operational, dynamic and current.

Overall point value: 14 points minimum/20 points maximum.

- a) Show formal documentation of the designation of the Geospatial Sciences “Center” and provide a URL as evidence of its existence.

Point Value: 5 points required

- b) Demonstrate the “Center” is operational, dynamic, and current: contains/makes available up-to-date access to/online links to key GS resources such as other academic institutions, professional organizations, government sites, conferences, workshops, center POC’s, GS news, etc. The “Center” must be easy to find, and easily accessible by students. Demonstrate how students know about the “Center.”

Point Value: 5 points required

- c) Demonstrate that GS journals are available for student and faculty use. Demonstrate that URLs to key GS online resources and provided in course syllabus and/or professor/instructor’s webpage or provided to students during class instruction.

Point Value: Up to 5 points/2 required

- d) Demonstrate that physical and/or virtual geospatial sciences labs, software, other equipment is available and used for hands-on learning (provide examples of student projects/exercises/case studies—syllabus links to assignment, etc.).

Point Value: Up to 5 points/2 required

3. Robust and Active Geospatial Science Academic Program. Demonstrate how students successfully participate in the academic program requirements aligned to GS curriculum that map to the CAE KUs.

Overall point value: 5 points minimum/10 points maximum

- a) Provide evidence that students who successfully take and pass a GS curriculum consisting of at least 18 credit hours that satisfy CAE KUs (core and optional) will

receive recognition in their transcript referencing the completion of a CAE GS course of study. Provide evidence in the form of a letter, transcript notation, and/or degree/certificate (student information may be redacted).

Point Value: 10 points/Students are taking a geospatial sciences curriculum path that includes all core and 5 optional KUs

5 points/Students have the opportunity to take a majority GS curriculum path that includes all core KUs

- b) Provide evidence that students who participate sufficiently in the GS curriculum for a Focus Area (i.e. take and pass courses that satisfy all of the optional KU requirements for that Focus Area) will receive a certificate, degree or other reference on their transcript to that Focus Area (student information may be redacted).

Point Value: 10 points/Students are taking a geospatial sciences curriculum path that includes all optional KUs in a Focus Area

5 points/Students have the opportunity to take all optional KUs in a Focus Area

4. Geospatial Science is Multidisciplinary within the Institution. The institution must demonstrate that GS is not treated as a separate discipline at your institution, but as a multidisciplinary science with the body of GS knowledge incorporated into various disciplines, such as geography, engineering, environmental management, etc.

Overall point value: 5 points minimum/10 points maximum.

- a) Evidence that geospatial science curriculum is taught in existing non-geospatial science courses and that non-geospatial science students are being introduced to geospatial science knowledge and methods.

Points: 1 point per course/2 courses required/up to 5 points.

- b) Non-geospatial science courses encourage papers or projects in geospatial science topics or using geospatial science methods and data. Provide online links to 3 – 5 best thesis, dissertation, or projects using geospatial sciences within 3 years of application.

Points: 1 point per paper/only 2 papers per course/up to 5 points.

5. Student-based Geospatial Science Research. The institution must demonstrate how it encourages **student** research in GS. Research should relate back to one or more of the KUs.

Overall point value: 10 points minimum/30 points maximum.

- a) Program with GS focus has thesis, dissertation, student papers or independent research project requirements. Programs with GS focus include declared majors, declared minors, established certificates of study within a major that produce GS research papers/projects. Provide links to 5 to 10 best actual thesis, dissertations, student papers or projects in geospatial sciences within 3 years of application (student information may be redacted).

Point Value: 1 point per paper or project/5 points required/10 points maximum

- b) List geospatial sciences courses that require research papers or project(s). Provide course titles that required these within 3 years of application. Provide link to course syllabus.

Point Value: 1 point per paper or project/5 points required/10 points maximum

6. Number of Geospatial Science (GS) Faculty and Course Load. The institution must demonstrate that the composition of the GS faculty consists of at least 1 full time GS faculty member and at least 3 additional faculty members (may be part-time, adjunct, visiting professor, etc.) teaching at least one GS course. **This criterion requires a link(s) to a biography or curriculum vitae for each GS faculty member.**

Overall Point Value: 6 points minimum/14 points maximum.

- a) Identify by name full-time employee or employees, as defined above, either faculty or member of the administration working in geospatial sciences with overall responsibility for a geospatial sciences program (E.g. a major or minor geospatial sciences program, geospatial sciences certificate program or graduate degree program). **Provide evidence, i.e., letter of testimony or job description. Provide link to biography or CV.**

Point Value: 3 points required.

- b) Identify by name additional full-time geospatial science faculty members (not listed in 6a.) teaching geospatial sciences courses within the department that sponsors the geospatial sciences programs. **Provide link to biography or CV.**

Point Value: 2 points each/6 points maximum.

- c) Identify by name part-time, shared (inter departmental, other institution, etc.), adjunct (industry expert, etc.) teaching GS courses within the department that sponsors GS programs. **Provide link to biography or CV.**

Point Value: 1 point each/5 points maximum.

7. Active Faculty in Current GS Practice and Research. The institution must clearly demonstrate that the faculty is active in current GS practice and research, contribute to GS literature, are members in GS professional societies, are subject matter experts or attend/present at professional GS conferences.

Overall Point Value: 15 points minimum/37 points maximum.

- a) Peer reviewed publications—papers (electronic or traditional) on geospatial science (inclusive of GEOINT) topics as evidenced in refereed journals or conference proceedings within the past 3 years. Provide links to actual papers.

Point Value: 2 points per paper/8 points maximum

- b) Published books or chapters of books on GS topics. Books/chapters must focus on GS (inclusive of GEOINT) issues and have been published within the last 5 years. Provide title, authors and date published, identify specific chapters if authoring a chapter of a book.

Point Value: 5 points per book/1 point per chapter/10 points maximum

- c) Faculty is involved in writing grants and obtaining funding for GS (inclusive of GEOINT) education and/or research development or lab equipment. Provide synopsis of geospatial related grants, funding, equipment donations or other funding to include date and approximate monetary value for the past 3 years.

Point Value: 2 points per award/6 points maximum

- d) Faculty members are subject matter experts in GS areas for professional certification or accreditation bodies and/or professional societies (e.g. UCGIS, GISCI, ASPRS, AAG, USGIF, GITA, URISA, OGC, etc.). Faculty members are also active members in these organizations and/or engaged by attending agencies' specific GS and R&D symposium, meetings and colloquia. List involvement for the last 3 years.

Point Value: 2 points per certification/accreditation review/participation (e.g. leadership role on committee, conference panel, etc.)/ 6 points maximum.

- e) Faculty members are engaged in and/or initiate student participation (e.g. students present papers) or membership in geospatial science professional societies.

Point Value: 1 point per presentation or membership/6 points maximum.

- f) Faculty presents geospatial science papers or thought leadership content at major Regional/National/International conferences and events. Provide synopsis of involvement for the last 3 years.

Point Value: 1 point per conference/4 points maximum.**CAE GS Knowledge Unit requirements:**

In addition to the above Program Requirements, institutions must also map their curriculum to all Core Knowledge Units and at least 5 Optional Knowledge Units. Where a KU has more than five (5) Topics or five (5) Learning Objectives, at least seven (7) of the Topics and Learning objectives for each KU must be satisfied.

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A Checklist for CAE in Geospatial Sciences Program Requirements

Requirement	Completed (Y/N)	Expected Points
1. Outreach/Collaboration: Overall Point Value: 12 points minimum/28 points maximum		
1a) Shared curriculum. Point Value: Up to 8 points		
1b) Reciprocity of credits. Point Value: Up to 5 points/3 points required		
1c) Sponsorship or participation in GS competitions. Point Value: Up to 5 points.		
1d) Local or State Government Outreach. Point Value: Up to 5 points		
1e) Community Outreach. Point Value: Up to 5 points		
2. Center for Geospatial Science Education: Overall point value: 14 points minimum/20 points maximum		
2a) Show formal documentation of the designation of the Geospatial Sciences "Center." Point Value: 5 points required		
2b) Demonstrate the "Center" is operational, dynamic, and current. Point Value: 5 points required		
2c) Demonstrate that GS journals are available for student and faculty use. Point Value: Up to 5 points/2 required		
2d) Demonstrate that physical and/or virtual geospatial sciences labs, software, other equipment is available and used for hands-on learning. Point Value: Up to 5 points/2 required		
3. Robust and Active Geospatial Science Academic Program: Overall point value: 5 points minimum/10 points maximum		
3a) Evidence that students who pass a GS curriculum consisting of at least 18 credit hours that satisfy CAE KUs (receive recognition in their transcript referencing the CAE GS or via an issued certificate. Point Value:10 points/Students are taking a geospatial sciences curriculum path that includes all core and 5 optional KUs 5 points/Students have the opportunity to take a majority of GS courses within the curriculum path that includes all core KUs		
3b) Evidence that students who participate sufficiently in the GS curriculum for a Focus Area receive recognition on their transcript or via an issued certificate to that Focus Area. Point Value:10 points/Students are taking a geospatial sciences curriculum path that includes all optional KUs in a Focus Area 5 points/Students have the opportunity to take all optional KUs in a Focus Area		

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4. Geospatial Science is Multidisciplinary within the Institution: Overall point value: 5 points minimum/10 points maximum		
4a) GS curriculum is taught in existing non-GS courses and non-GS students are introduced to GS knowledge and methods. Points: 1 point per course/2 courses required/up to 5 points		
4b) Non-GS courses encourage papers or projects in geospatial science topics or using geospatial science methods and data. Points: 1 point per paper/only 2 papers per course/up to 5 points		
5) Student-based Geospatial Science Research: Overall point value: 10 points minimum/30 points maximum		
5a) Program with GS focus has thesis, dissertation, student papers or independent research project requirements. Point Value: 1 point per paper or project/5 points required/10 points maximum		
5b) List geospatial sciences courses that require research papers or project(s). Provide course titles that required these within 3 years of application. Point Value: 1 point per paper or project/5 points required/10 points maximum		
6. Number of Geospatial Science Faculty and Course Load: Overall Point Value: 6 points minimum/14 points maximum		
6a) Full-time employee or employees either faculty or member of the administration working in GS with overall responsibility for a GS program. Point Value: 3 points required		
6b) Additional full-time GS faculty members (not previously listed) teaching GS courses within the department that sponsors the GS programs. Point Value: 2 points each/6 points maximum		
6c) Part-time, shared (inter departmental, other institution, etc.), adjunct (industry expert, etc.) teaching GS courses within the department that sponsors GS programs. Point Value: 1 point each/5 points maximum		
7. Active Faculty in Current GS Practice and Research: Overall Point Value: 15 points minimum/37 points maximum		
7a) Peer reviewed publications—papers on GS (inclusive of GEOINT) topics. Point Value: 2 points per paper/8 points maximum		
7b) Published books or chapters of books on GS topics. Point Value: 5 points per book/1 point per chapter/10 points maximum		
7c) Faculty involved in writing grants and obtaining funding for GS (inclusive of GEOINT) education and/or research development or lab equipment. Point Value: 2 points per award/6 points maximum		

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7d) Faculty members are subject matter experts in GS areas for professional certification or accreditation bodies and/or professional societies. Point Value: 2 points per certification/accreditation review/participation (e.g. leadership role on committee, conference panel, etc.)/ 6 points maximum		
7e) Faculty members are engaged in and/or initiate student participation (e.g., students present papers) or membership in geospatial science professional societies. Point Value: 1 point per presentation or membership/6 points maximum.		
7f) Faculty presents geospatial science papers or thought leadership content at major Regional/National/International conferences and events. Point Value: 1 point per conference/4 points maximum		
CAE GS Knowledge Unit requirements		
Meet all Core Knowledge Units		N/A
Meet five (5) Optional Knowledge Units		N/A